

22 October 2020 – High Powered Paper Rockets

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00:00:09.719 --> 00:00:18.630

Torey Earle: Hi everybody and welcome to the Kentucky 4-H Virtual Experience. Today we're going to talk about SET or Science, Engineering and Technology.

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00:00:19.620 --> 00:00:30.270

Torey Earle: My name is Torey Earle and I am an Extension Specialist for 4-H Youth Development with the University of Kentucky College of Agriculture, Food and Environment Cooperative Extension Service.

3

00:00:37.830 --> 00:00:48.780

Torey Earle: Today, in part two of our Kentucky 4-H Virtual Experience, looking at the 4-H aerospace project, you're going to take the stomp rocket launcher that you build in part one.

4

00:00:49.860 --> 00:00:55.920

Torey Earle: And you're going to build a high-powered paper rocket to launch from that launcher.

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00:00:56.940 --> 00:01:09.990

Torey Earle: Please keep in mind that this activity should be done outside and in a safe open area. Now let's move in to building our rocket

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00:01:11.760 --> 00:01:27.240

Torey Earle: The things that you'll need for part two building your high-power rocket are on the table. First you need two or three pieces of card stock. You can use any color you want to eight and a half by 11 size.

7

00:01:28.980 --> 00:01:35.850

Torey Earle: You'll probably want to have some templates for cutting or for making your nose cone.

8

00:01:36.240 --> 00:01:50.550

Torey Earle: And for making your fins. I do want to give a thanks to the folks with the Challenger Learning Center for providing these templates for us. Or you can choose to create your own fins and your own nose cone.

9

00:01:53.550 --> 00:02:01.500

Torey Earle: Probably want to have a pair of scissors handy to cut out your fins and your nose cone and also do a little trimming on any of the tape that you might need to

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00:02:02.760 --> 00:02:11.190

Torey Earle: You want to have one piece of your 12-inch PVC half inch diameter pipe from your stomp rocket launcher.

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00:02:13.830 --> 00:02:17.910

Torey Earle: You'll need some clear cellophane tape.

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00:02:19.110 --> 00:02:29.070

Torey Earle: And you'll also need some clear packing tape as well to get started. The first thing you're going to have to decide is do you want your rocket tall.

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00:02:30.210 --> 00:02:48.600

Torey Earle: Or do you want your rocket short either way is perfectly acceptable. It's just up to you to decide. I'm going to make a short rocket. So, I'm going to take the piece of PVC pipe for my launcher and I'm just going to start rolling it

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00:02:50.040 --> 00:02:58.920

Torey Earle: A rolling my card stock around the piece of PVC pipe, trying to keep it pretty snug around it.

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00:02:59.940 --> 00:03:03.420

Torey Earle: In order to form the body of my rocket

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00:03:06.060 --> 00:03:08.430

Torey Earle: I keep rolling like this.

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00:03:10.650 --> 00:03:16.860

Torey Earle: fairly snug and I'm going to take one piece small piece of the cellophane tape.

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00:03:20.790 --> 00:03:29.130

Torey Earle: And tape that same together. Now it's still open here and we're going to use the packing tape to seal that

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00:03:32.580 --> 00:03:37.410

Torey Earle: I tear me on a piece of packing tape.

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00:03:39.810 --> 00:03:44.310

Torey Earle: And then I'm going to seal that same

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00:03:45.780 --> 00:03:47.310

Torey Earle: All the way down my rocket

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00:03:49.860 --> 00:03:53.940

Torey Earle: And be careful not to tape your rocket body.

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00:03:54.990 --> 00:03:58.470

Torey Earle: To the PVC pipe, otherwise you won't be able to launch it.

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00:03:59.820 --> 00:04:02.730

Torey Earle: And take my scissors and trim off.

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00:04:04.080 --> 00:04:05.550

Torey Earle: The end of the packing tape.

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00:04:06.750 --> 00:04:09.840

Torey Earle: Put it to the side, same thing at the other end.

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00:04:11.790 --> 00:04:14.940

Torey Earle: Trim off the end of my packing tape, put it to the side.

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00:04:16.200 --> 00:04:22.290

Torey Earle: So, maybe places we can use it later. And then just move the packing tape down

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00:04:25.230 --> 00:04:26.130

Torey Earle: This gives you

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00:04:28.830 --> 00:04:31.800

Torey Earle: A nice tube, which is the body rocket

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00:04:33.840 --> 00:04:40.080

Torey Earle: And you may want to check to see that it slides over a piece of PVC pipe.

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00:04:41.700 --> 00:04:48.750

Torey Earle: Easily because this is the size of your launch, too. And you don't want your rocket to be too small.

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00:04:50.760 --> 00:05:02.820

Torey Earle: To fit on the tube or you don't want it to be too big. So, it lets air out when you launch. So, now we have our rocket body to

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00:05:04.290 --> 00:05:09.330

Torey Earle: The templates that we have for our nose cone and for our fins.

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00:05:10.380 --> 00:05:23.370

Torey Earle: Again, had been provided by the challenger Learning Center, and these are best printed on card stock. I will actually provide you a link to where you can download face.

36

00:05:24.960 --> 00:05:28.110

Torey Earle: But printed on card stock will make them.

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00:05:29.370 --> 00:05:33.360

Torey Earle: very sturdy to put onto your rocket

38

00:05:36.360 --> 00:05:40.230

Torey Earle: So, you can see I've already cut my nose cone template out

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00:05:42.120 --> 00:05:54.690

Torey Earle: And I've kept my fan templates out that I want to use. You can choose to use to fins three fins for fins. How many ever you want to. And again, you can design your own if you would like to do that.

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00:05:56.640 --> 00:06:01.110

Torey Earle: For these purposes. I'm going to use these to show you how to assemble the rocket

41

00:06:02.130 --> 00:06:02.700

Torey Earle: And

42

00:06:04.170 --> 00:06:05.910

Torey Earle: We'll see how it launches after that.

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00:06:08.370 --> 00:06:14.340

Torey Earle: One of the things that you want to remember about your rocket body is as it

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00:06:15.390 --> 00:06:23.250

Torey Earle: Slides on for the launch to air is going to be forced up through the tube itself so

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00:06:23.760 --> 00:06:36.600

Torey Earle: Want to end of your rocket body, it's going to need to be sealed really well. You don't want to say about the end or you wouldn't be able to put it on launch day. So, I'm going to take another small piece of my packing tape.

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00:06:41.220 --> 00:06:43.380

Torey Earle: And I'm going to put it over.

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00:06:44.820 --> 00:06:47.490

Torey Earle: One end of my rocket tube.

48

00:06:50.220 --> 00:06:51.120

Torey Earle: Like that.

49

00:06:52.170 --> 00:06:56.220

Torey Earle: Say that seals that end. Then we'll press it down.

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00:06:58.410 --> 00:07:02.490

Torey Earle: To make sure we get a good seal or rocket

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00:07:04.320 --> 00:07:07.680

Torey Earle: That way, no air leaks out and

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00:07:10.500 --> 00:07:17.520

Torey Earle: We can slide the other end over our launch team. Now, you may ask, well, why didn't we just take the nose cone together and put it on there.

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00:07:18.000 --> 00:07:26.100

Torey Earle: There's going to be enough air pressure coming out of this stop rocket launcher that it would actually blow that I was coming off and your rocket wouldn't go anywhere.

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00:07:28.770 --> 00:07:38.100

Torey Earle: You can try and see. But that's the experience that I've had now to form the nose cone. You want to make sure you've got some of your cellophane tape handy.

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00:07:40.740 --> 00:07:55.560

Torey Earle: You'll take one end of your nose cone template that you've cut out, put it under the other side like this and it starts to form a column as you push those together.

56

00:07:58.230 --> 00:08:04.320

Torey Earle: The best way I found is to just start rolling it up, kind of like an ice cream cone would roll up

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00:08:06.420 --> 00:08:07.680

Torey Earle: Any of you have ever seen.

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00:08:09.120 --> 00:08:15.120

Torey Earle: waffle count made at a local ice cream shop. This is how I do it. They just roll them up.

59

00:08:20.880 --> 00:08:22.320

Torey Earle: And make sure that they

60

00:08:24.150 --> 00:08:25.050

Torey Earle: It snug.

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00:08:30.210 --> 00:08:32.550

Torey Earle: roll this up just a little tighter here.

62

00:08:33.960 --> 00:08:36.570

Torey Earle: Because you want to open it up to worry

63

00:08:38.790 --> 00:08:39.330

Torey Earle: Over

64

00:08:40.620 --> 00:08:41.700

Torey Earle: Your rockin body.

65

00:08:43.980 --> 00:08:44.880

Torey Earle: It a little tighter.

66

00:08:46.920 --> 00:08:51.120

Torey Earle: Slide over their life, and I still I still like to give them just a little tighter than that.

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00:08:54.270 --> 00:08:55.320

Torey Earle: There we go.

68

00:08:56.760 --> 00:09:05.520

Torey Earle: Now that's just going to fit over a rocket body. So, I'm gonna take a small piece of my cellophane tape.

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00:09:09.000 --> 00:09:12.900

Torey Earle: And tape that around, so our cone stays together.

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00:09:14.790 --> 00:09:15.330

Torey Earle: Then

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00:09:16.830 --> 00:09:18.240

Torey Earle: will fit it on to

72

00:09:19.890 --> 00:09:24.420

Torey Earle: Our a rocket body take another small piece of the cellophane tape.

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00:09:26.160 --> 00:09:37.080

Torey Earle: to tape it on and you want to make sure that you also get it nice and straight. Because if you get the nose cone little crooked your rocket may fly crooked.

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00:09:40.290 --> 00:09:43.080

Torey Earle: Then I take some more of my packing tape. You notice, I use the packing tape.

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00:09:45.570 --> 00:09:53.730

Torey Earle: Quite a bit because it is very sturdy, and it holds your rocket together very well. I'll take that. I can take

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00:09:54.780 --> 00:09:57.450

Torey Earle: And try to keep as many wrinkles out of it as possible.

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00:09:59.250 --> 00:10:01.380

Torey Earle: Wrap it around the bottom of your nose cone.

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00:10:03.630 --> 00:10:04.440

Torey Earle: And stay lit well

79

00:10:05.670 --> 00:10:06.630

Torey Earle: I sit down on there.

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00:10:07.650 --> 00:10:08.340

Torey Earle: Like this.

81

00:10:09.450 --> 00:10:09.780

Torey Earle: Now,

82

00:10:11.370 --> 00:10:24.180

Torey Earle: As air goes in the top of our body rocket body to be sealed so no air should come out so you shouldn't have to worry about blowing your nose cone off as you would launch a rocket

83

00:10:26.610 --> 00:10:42.450

Torey Earle: Said that right there. And we're going to concentrate on our fins a fan design that I cut out is is totally different than what you may do. But one thing I do want to indicate to you from the fins on the template.

84

00:10:43.740 --> 00:10:50.970

Torey Earle: You'll notice that it's got a flat piece on the side of the fan that will fit toward the body, like so.

85

00:10:52.260 --> 00:10:53.610

Torey Earle: And there is a little

86

00:10:54.630 --> 00:10:56.580

Torey Earle: Line on that tab.

87

00:10:57.810 --> 00:10:59.280

Torey Earle: That you'll take your scissors.

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00:11:00.930 --> 00:11:04.020

Torey Earle: And just cut that line.

89

00:11:06.060 --> 00:11:06.780

Torey Earle: And then

90

00:11:08.310 --> 00:11:09.390

Torey Earle: Fold

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00:11:12.000 --> 00:11:15.090

Torey Earle: One tab to one side and fold

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00:11:17.730 --> 00:11:30.990

Torey Earle: The other tab to the other side. What that does, it gives you two flat pieces. Those two flat pieces will then fit right onto your rocket body and you can take your fan off.

93

00:11:34.500 --> 00:11:36.210

Torey Earle: I'll take a piece in the cellophane tape.

94

00:11:37.620 --> 00:11:43.980

Torey Earle: And then I will use the packing tape. Again, but I put one on one tab.

95

00:11:48.120 --> 00:11:51.000

Torey Earle: I put one on the tab on the other side.

96

00:11:52.620 --> 00:11:54.660

Torey Earle: And I'm going to very carefully.

97

00:11:56.250 --> 00:11:56.790

Torey Earle: Put

98

00:11:58.920 --> 00:11:59.850

Torey Earle: My fin.

99

00:12:02.190 --> 00:12:04.980

Torey Earle: On to my rocket

100

00:12:08.280 --> 00:12:08.910

Torey Earle: Like that.

101

00:12:11.340 --> 00:12:18.480

Torey Earle: When I get all my fins on I will actually put the packing tape on either side of it to hold it on straight

102

00:12:21.030 --> 00:12:23.040

Torey Earle: As you place your fins on your rocket

103

00:12:24.210 --> 00:12:29.970

Torey Earle: You want to think about spacing them evenly around the rocket as well. I have three fins.

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00:12:31.050 --> 00:12:33.000

Torey Earle: So, if I was looking

105

00:12:35.430 --> 00:12:38.400

Torey Earle: At my rocket like this have one straight up.

106

00:12:39.690 --> 00:12:57.150

Torey Earle: If I want them evenly spaced. I'm going to have to put one an angle down here and one at an angle on the other side. If I was using, for they would probably come straight out straight out and straight out this side.

107

00:12:58.230 --> 00:13:06.540

Torey Earle: So, depending on the number of fins, you use will depend on your spacing of those fins around your rocket

108

00:13:07.590 --> 00:13:08.760

Torey Earle: So, what I'm going to do.

109

00:13:11.100 --> 00:13:13.740

Torey Earle: Is place that one.

110

00:13:16.590 --> 00:13:17.520

Torey Earle: Right there.

111

00:13:23.010 --> 00:13:27.210

Torey Earle: And then I'm going to go about halfway between those two.

112

00:13:30.030 --> 00:13:31.380

Torey Earle: And place this one.

113

00:13:32.400 --> 00:13:33.000

Torey Earle: Right.

114

00:13:34.860 --> 00:13:35.430

Torey Earle: Here.

115

00:13:40.380 --> 00:13:42.330

Torey Earle: Trying to keep them as straight as possible.

116

00:13:43.560 --> 00:13:52.410

Torey Earle: So, we don't have a rocket wobbling all over the place. And that's what it's going to look like when you get your fins on

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00:13:53.010 --> 00:14:03.030

Torey Earle: Now again, your design, maybe a little different. You may choose to put the fins up higher on the rocket body he may choose to make them stick out a little bit past the bottom

118

00:14:03.450 --> 00:14:12.510

Torey Earle: You may use for we may use to you. Are you six, I don't know, but that will totally be up to you as far as your design goes

119

00:14:15.390 --> 00:14:23.490

Torey Earle: But I'm going to do now its place the packing tape on here and seal everything up.

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00:14:26.820 --> 00:14:36.870

Torey Earle: As you finish up your rocket design, we'd like to see some, some of the designs that are out there. So, don't hesitate to send us a note.

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00:14:38.190 --> 00:14:47.730

Torey Earle: Provide some pictures provide some video of you and your family building rockets and we're going to take this out and see how it launches.

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00:14:49.050 --> 00:15:01.650

Torey Earle: As we moved outside to do our launching, we've actually recruited a young NASA astronaut to help us with the launch. So, let's see how it goes. And we'll do a couple of launches and see what happened.

123

00:15:41.160 --> 00:15:42.570

Torey Earle: I think it stuck in the tree.

124

00:15:44.520 --> 00:15:57.540

Torey Earle: Well, how did it do? What did you discover? Did you think of ways you might improve your rocket? If you want to launch it again, did you think of a new design that you might want to try on a different launch?

125

00:15:58.560 --> 00:16:14.340

Torey Earle: Whatever your result was you did create something from scratch. And you did rocket science. Plus, you were able to think through problems, you were able to use design to create something

126

00:16:14.790 --> 00:16:26.400

Torey Earle: And hopefully you had a little fun with it too. I hope you've enjoyed the two-part series on the 4-H aerospace project for the Kentucky 4-H Virtual Experience.

127

00:16:27.870 --> 00:16:46.620

Torey Earle: Thank you for joining me today for the Kentucky 4-H virtual experience focused on Science, Engineering and Technology. For more information about any of the Kentucky 4-H projects or programs. Please check out your local University of Kentucky Cooperative Extension office.